Issues in Fetal Alcohol Syndrome Prevention

Unlike most other birth defects, Fetal Alcohol Syndrome (FAS) has the potential to be entirely preventable because its direct cause—maternal drinking—is presumed to be a controllable behavior. Although many strategies to prevent FAS have been developed and implemented in recent years, rigorous scientific research on the effectiveness of these approaches is, relatively speaking, in its infancy.

In the decades since FAS was discovered, more than 1,000 research articles have been published on the topic (see reviews in Stratton et al. 1996; Streissguth et al. 1985; Waterson and Murray-Lyon 1990). Most of this literature has emphasized the biochemical mechanisms of damage to the fetus, the physical characteristics of the syndrome in humans and animals, and biologic descriptions of the birth defects associated with the syndrome. Substantially less information has been published about the patterns of drinking by pregnant women, the social and psychological risk factors associated with drinking during pregnancy and the birth of FAS children, or the processes by which drinking, particularly heavy drinking, by pregnant women can be prevented. Because FAS is theoretically completely preventable through behavioral change, it is of vital importance to increase our understanding of the essential ingredients of behavioral change and of effective ways to encourage pregnant women to adopt them.

This section summarizes several major reviews of FAS prevention efforts, describes issues related to research methods and evaluations, and presents research findings on prevention approaches targeted to women at different risk levels. The prevention approaches are grouped into three categories set forth in an Institute of Medicine (IOM) report (Stratton et al. 1996): "universal" approaches, which are broad, populationwide strategies such as media campaigns aimed at all women of childbearing age regardless of risk; "selective" prevention strategies aimed at women known to be at some increased risk because they are drinking while pregnant or belong to a vulnerable subgroup; and "indicated" prevention strategies aimed at women who are at the highest risk because of their heavy drinking levels or history of having had a child with FAS. Brief mention of international implications is included as well.

Reviews of Prevention Programs and Research

One of the earliest comprehensive literature reviews on FAS prevention summarized more than 200 relevant articles and books and described the state of knowledge about FAS prevention in both the United States and the United Kingdom (Waterson and Murray-Lyon 1990). The authors identified two major shortcomings in the literature on FAS prevention: (1) most of the prevention projects and studies did not take full advantage of the existing theory and knowledge base in the fields of health promotion and health education, and (2) inadequate attention was paid to the risk factors that affected the targeted populations' heavy drinking and other relevant behaviors.

A second review of more than 160 articles described treatment programs designed to reduce fetal alcohol exposure and damage in alcohol- and drug-dependent women (Finkelstein 1993). According to the author, "research suggests that programs that provide comprehensive and coordinated treatment are better able to draw pregnant women into care as well as provide more effective treatment" (Finkelstein 1993, p. 1275). A number of sources reviewed in this article recommended comprehensive social, cognitive-behavioral, medical, and referral services for women who are abusing alcohol as the most effective treatment approach. The article also notes that coordination of services through an active case manager is considered by many to be essential (Finkelstein 1993; see also Brindis and

Theidon 1997; Godley et al. 1994; Siegal et al. 1995). In addition, other reports (Hughes et al. 1995; Kaufman 1996; Namyniuk et al. 1997) have indicated that comprehensive programs should include active outreach strategies to attract high-risk drinkers, and may need to offer family support and counseling services as well as medical and psychiatric care.

A third review (May 1995) differed from earlier summaries in emphasizing a public health approach to the prevention of FAS. The author contended that prevention programs should be based on the epidemiology of both FAS and adult drinking patterns in the target population and should focus on specific maternal risk factors, which he identifies (table 1). Drawing on more than 170 sources, the author classified strategies from the perspective of the three levels of prevention commonly used in the field of public health: primary prevention approaches, which attempt to stop maternal drinking before it starts; secondary approaches, which facilitate early detection and treatment of maternal drinking problems before they lead to FAS; and tertiary approaches, which attempt to change the behaviors of women who are at very high risk because they have already delivered a child with diagnosable FAS or other alcohol-related disorders, such as alcohol-related birth defects (ARBD) and alcohol-related neurodevelopmental disorder (ARND). On the basis of national survey data on alcohol and other

Table 1: Major maternal risk factors associated with Fetal Alcohol Syndrome and alcohol-related birth defects

Factor	Reference(s)
Age: >25 years	Abel and Sokol 1987; May et al. 1983
Number of children: >3	Abel 1988; Abel and Sokol 1987; Davis and Lipson 1984; Hankin and Sokol 1995
Separated, divorced, or never married	Gehshan 1995; Hilton 1991; Wilsnack et al. 1991
High blood alcohol concentration	Chang et al. 1997; Day et al. 1993; Godel et al. 1992
Binge drinking	Chang et al. 1997; Day et al. 1993; Godel et al. 1992
Long history of drinking	May et al. 1983; Sokol et al. 1980
Heavy drinking by male partner	Wilsnack and Beckman 1984; Wilsnack et al. 1991
Heavy drinking by any family member	Abel 1988
Culture tolerant of heavy drinking	May et al. 1983; Robinson et al. 1987
Low socioeconomic status	Abel 1995; Abma and Mott 1991; Bingol et al. 1987; Sokol et al. 1986
Work in male-dominated occupation	Gehshan 1995; Wilsnack and Wilsnack 1992; Wilsnack et al. 1991
Unemployment	Gehshan 1995; Wilsnack and Wilsnack 1992; Wilsnack et al. 1991
Social transience	May et al. 1983; Streissguth et al. 1985
Low self-esteem	Kaskutas 1996
Loss of children to foster or adoptive care due to neglect, abuse, or abandonment	Habbick et al. 1996; May et al. 1983; Streissguth et al. 1985
Sexual dysfunction	Wilsnack et al. 1991
Use of multiple substances	Day et al. 1993; Godel et al. 1992; Serdula et al. 1991
Cigarette smoking	Day et al. 1993; Godel et al. 1992; Serdula et al. 1991

Source: Adapted and updated from May 1995.

drug use patterns, the author estimated that primary prevention is all that is needed for most (78 percent) of the female population who are of childbearing age (defined in the article as aged 18 through 49), secondary prevention may be necessary for approximately 14 to 25 percent, and tertiary prevention is appropriate for only 2 to 6 percent (May 1995).

More recently, the IOM's Committee to Study Fetal Alcohol Syndrome reviewed a vast body of FAS literature and proposed its own comprehensive recommendations, which included a variety of prevention measures (Stratton et al. 1996). The review prompted the committee to adopt a prevention system that was somewhat different in theory and terminology from the standard public health categories of primary, secondary, and tertiary prevention. The three levels of prevention in the IOM scheme, as mentioned previously, are called universal, selective, and indicated:

- Universal approaches attempt to promote the health and well-being of all individuals in society or in a particular community, without regard to individual risk, through use of the media to educate the public and through policy and environmental change.

- Selective preventive interventions target individuals and subgroups who are at excess risk of developing the problem, such as women of childbearing age who drink alcohol. The IOM report (Stratton et al. 1996) notes that selective interventions should be given by health care providers who are trained to question women about their drinking and contraceptive histories and to deliver interventions that are proportional to the woman's level of risk.

- Indicated interventions are targeted to women who are at high risk of giving birth to an alcohol-impaired child, not simply because they belong to a vulnerable population but because, for instance, they are drinking at a level that is likely to produce FAS-affected offspring or they have already delivered one child with FAS.

For this last category of indicated interventions, the IOM report recommends that providers offer treatment in the form of brief interventions or more formal approaches as needed. Although prevention strategies generally stop short of treatment, the logic underlying this recommendation is that "treatment of alcohol problems in women (and their partners) is an appropriate indicated preventive intervention for the fetus being carried by the woman, as well as for children who might subsequently be conceived and borne by her" (Stratton et al. 1996, p. 36). The report also states that referral to birth control information and services may be appropriate and that case management should extend to "aftercare," a program component that maintains contact with FAS mothers and children to address social issues over time (Stratton et al. 1996).

Methodological and Evaluation Issues

Researchers who have reviewed and summarized the FAS prevention literature have emphasized the need for scientifically rigorous evaluations of prevention strategies that have been implemented in clinic and community settings. In a critical analysis of primarily clinical intervention research (Schorling 1993), three basic criteria were used to select studies for review: (1) prospective determination of alcohol use among a cohort of pregnant women, (2) implementation of a specific intervention among women at risk, and (3) postintervention assessment of alcohol use among the target population. At the time of that review, only five studies met these criteria for inclusion. Eight standards were then imposed on the studies for methodological efficacy, including the use of a control group, sufficient sample size, and consistent follow-up of study participants. None of the studies involved randomization; only two used a control group, and neither of those found any postintervention difference in alcohol use between the treatment and control groups.

In a later review, the IOM's Committee to Study Fetal Alcohol Syndrome evaluated methodologies reported in the literature on FAS prevention, including both published reports and unpublished materials from projects supported by Federal Health and Human Services agencies (Stratton

et al. 1996). The committee concluded that controlled research on the prevention of FAS is scarce and that the "utility and value of many of these programs as prevention efforts is unknown because of the limited evaluative component of the programs" (Stratton et al. 1996, p. 113).

A third review that focused on design and methodological issues identified five key elements for future FAS prevention research (May 1996):

- Prevalence: Baseline determination of the exact birth prevalence of FAS (and, if possible, ARBD and ARND) in the target population through active surveillance.

- Social and Medical Risk Factors: Detailed analysis of the social and medical risk factors of mothers of alcohol-impaired children so that appropriate high-risk groups and situations can be targeted.

- Role of the Male Partner: Delineation of the explicit behavioral, social, and psychological role of the male partner in enabling FAS (see, for example, Ihlen et al. 1990; Rubin et al. 1988).

- Emphasis on High-Risk Women: Focusing evaluations on indicated and selective prevention modalities because of the concentrated risk for FAS among a relatively small number of heavily drinking women.

- Community Trials: Institution of well-evaluated, comprehensive, communitywide prevention trials that use public health approaches and include matched control communities and the collection of baseline and postintervention data.

A major methodological impediment to evaluating community-based FAS prevention programs is the difficulty in determining a baseline prevalence figure for the target population. To date, the prevalence of FAS has been determined almost exclusively in certain American Indian and Alaskan Native communities (May 1996), where integrated public health care systems and well defined, homogeneous populations make such ascertainments possible. In larger communities, it will be necessary to develop representative sampling protocols and appropriate statistical corrections.

To gain estimates of FAS prevalence, it may be possible to use proxy measures that indicate likely alcohol-related effects. A number of studies have established or examined potential proxy measures, including facial defects and other physical abnormalities, growth and development indicators, and neurobehavioral indicators (see, for example, Day et al. 1989, 1990, 1991; Godel et al. 1992; Jacobson and Jacobson 1994; Jacobson et al. 1993; Rostand et al. 1990; Streissguth et al. 1990, 1994; Walpole et al. 1990). Although studies of the prevalence of characteristics consistent with prenatal alcohol exposure are currently ongoing, caution is warranted in using such proxy measures to evaluate the effectiveness of interventions. Not all problems found in alcohol-exposed children are necessarily caused by alcohol exposure; the actual fraction attributable to alcohol consumption needs to be determined (Khoury et al. 1996).

Reaching to All, Regardless of Risk: Universal Prevention Approaches

Surveys have found that most women reduce or cease their drinking during pregnancy (Kaskutas and Graves 1994). Research indicates that this reduction may be linked to universal prevention messages in reading material and in radio and television advertisements (Waterson and Murray-Lyon 1989) or to increased exposure to messages from a variety of sources during pregnancy, including having personal conversations about drinking during pregnancy (Kaskutas and Graves 1994). However, another study found that decreases in alcohol consumption during pregnancy are not necessarily associated with exposure to messages of any kind, including conversations (Kaskutas et al. 1998). The authors suggest that this may be occurring because in recent years, pregnant women have been less frequently exposed to advertisements advising them not

to drink and may have had fewer conversations about drinking during pregnancy.

One universal prevention strategy is the use of alcoholic beverage labels that warn about the risks of birth defects if women drink alcohol during pregnancy. Some research (Hankin et al. 1993*a*, 1994, 1996) has found that the labels have a preventive effect on lighter drinkers but not on women who are the heaviest drinkers and who are thereby at greatest risk of bearing a child with FAS. Similar problems in affecting heavily drinking pregnant women also seem to characterize other public education approaches, such as warning signs on buses or billboards (Fitzgerald 1988; Little et al. 1981, 1984, 1985; Weiner et al. 1989). Other studies also suggest that women who are the heaviest and most long-term drinkers show the least amount of change in their drinking behavior once they become pregnant (Serdula et al. 1991; Smith et al. 1987).

Some recent comprehensive community-based approaches to preventing FAS contain strong, universally focused strategies in addition to their emphasis on targeting high-risk women with selected and indicated interventions (May 1996; see also May et al. 1993; Oetting et al. 1995; Soman 1992). Although some limited communitywide approaches were instituted early in the history of FAS prevention efforts in the northwestern United States (Little et al. 1981, 1984, 1985; Streissguth et al. 1985), this early literature primarily stressed the need for smaller scale, treatment-based interventions.

A prototype for community-based research on interventions to prevent FAS is offered by the quasi-experimental trials to prevent cardiovascular disease through changes in knowledge, attitudes, beliefs, and lifestyles (Farquhar et al. 1990; Luepker et al. 1993). These evaluative research designs used control (or comparison) communities as well as pre- and posttest measures to assess effects of the prevention strategies. A new National Institute on Alcohol Abuse and Alcoholism-supported FAS prevention trial in relatively high-prevalence American Indian communities has adopted a similar model (CRISP 2000).

Since the early 1990's, community-based trials of interventions to prevent alcohol abuse and related problems have become relatively frequent. However, with few exceptions, they have not focused on the reduction of alcohol-induced birth defects or drinking by pregnant women. Generally speaking, these studies have used quasi-experimental and experimental (randomized) designs to test the effectiveness of strategies to reduce underage drinking and alcohol-related trauma, which is largely induced by drinking and driving (Hingson et al. 1996; Holder 1997; Perry et al. 1996; Wagenaar et al. 1994, 1999, 2000, in press). Current methodologies now permit the analysis of neighborhoods (subcommunities) within larger urban areas (Gruenewald 1997), which has implications for FAS prevention research because higher risk populations may be concentrated in definable neighborhoods.

Targeting Those at Increased Risk: Selective Prevention Approaches

Much information regarding risk factors for FAS (such as age, socioeconomic status, and spousal characteristics) is available and can help provide appropriate population targets for selected and indicated prevention strategies (see Abma and Mott 1991; Coles et al. 1997; Gehshan 1995; Testa and Leonard 1995). Although an abundance of prevention programs dealing with prenatal alcohol abuse exist throughout the country, few have been evaluated (Stratton et al. 1996). In some cases in which data have at least been collected before and after the intervention, it may be possible to conduct retrospective data analyses as a means of pilot-testing hypotheses and drawing insights about the effectiveness of particular approaches to prevention and treatment. For example, a retrospective study of pregnant women and mothers who participated for at least 5 months in a California substance abuse treatment program indicated that high-risk women who received more basic therapeutic and case management services, especially family therapy services, were more likely to remain abstinent from alcohol and other drugs than were those who did not receive these services (Zlotnick et al. 1996).

In selective prevention approaches, the major research and evaluation issues are threefold. First, it is necessary to determine the effect of alcohol-focused interventions (including health information, screening, and advice or counseling) aimed at high-risk groups. Second, it is important to determine the extent to which strategies to promote birth control can have an impact. Finally, it is appropriate to assess the possible benefits of combining these approaches, especially for women who may be resistant to abstinence or who are at excess risk of having unplanned pregnancies.

Women at increased risk of having FAS children need to be accurately and efficiently identified through screening in settings such as clinics that provide primary and prenatal care to low-income women (Chang et al. 1997; Hankin and Sokol 1995; Harwell et al. 1996; Kaskutas 1996; Loneck et al. 1997). Some investigators have provided guidelines for detecting higher risk drinkers in primary care settings (Chang et al. 1997; Hankin and Sokol 1995). Once such women are identified, a number of other questions become paramount, such as their readiness for change, the factors that affect readiness, and actual turning points toward abstinence (Kaskutas 1996). These issues need to be addressed and evaluated, as they now are in other alcohol research that does not involve pregnant women.

Many of the screening questionnaires most commonly used to identify problem drinking are less accurate for women than for men (Bradley et al. 1998). The same may be true for more open-ended screening interviews. Reasons for this difference probably include the increased stigma experienced by women who drink (Gomberg 1988), which may lead them to underreport alcohol problems. Women are also less likely to have experienced some of the more adverse consequences of drinking, such as employment, economic, or social problems (Robbins 1989; Weisner 1990); thus, standard screening instruments may fail to identify women whose drinking problems are expressed in other ways. In addition, screening questionnaires may not detect drinking problems as readily in women (Bradley et al. 1998; Dawson 1994), because women experience greater physical effects of alcohol at lower levels of consumption than men do.

Attempts to improve identification of women who drink during pregnancy have focused on comparing the accuracy of various screening instruments with each other and with informal questioning by health care workers. In one study (Chang et al. 1998), the T-ACE questionnaire (table 2) was more effective than assessments by health care staff in identifying pregnant women at risk for problem drinking. Other efforts to develop accurate screening instruments for use among women have taken place among American Indian populations (Bull et al. 1999). However, because alcohol use during pregnancy is not confined to cultural and racial/ethnic minorities or to low-socioeconomic groups (Chang et al. 1998), more such work is needed to develop instruments for use among general populations of women of childbearing age.

Women who give birth to FAS children are somewhat unstable in occupational, marital, and familial relationships and tend to be geographically mobile (May et al. 1983; Streissguth et al. 1985). No specific prevention studies (other than a few analyses of case management) have effectively addressed these problems. Problems related to transience (when patients leave a prevention or treatment program) are not only an issue for FAS prevention but also for research, because they can distort the results of evaluation studies. Research is therefore necessary on how best to attract highly mobile, high-risk individuals to prevention and treatment programs and to identify incentives that will encourage long-term participation for both therapy and longitudinal research (Siegal et al. 1995). Existing methods of longitudinal tracking used in other areas of research might be adapted to studies of FAS prevention.

Helping Those at Highest Risk: Indicated Prevention Approaches

Effective approaches to FAS prevention among the highest risk women (particularly mothers who have previously given birth to an alcohol-impaired child) would eliminate most of the existing FAS problem, because these women account for the majority of FAS cases. Epidemiologic studies of various populations have shown that women who have one child with FAS are likely to have other children with alcohol-related impairments in subsequent pregnancies (May et al. 1983).

Reaching these high-risk women is problematic. Many of the programs described in the FAS clinical intervention literature deal with women who have been referred from prenatal clinics because they exhibit signs of early-onset, high-risk drinking. However, a large number of heavily drinking pregnant women never present themselves to prenatal clinics and are otherwise elusive. If they receive therapy for their alcohol dependence, such treatment rarely includes an emphasis on FAS prevention. Although a few programs in small communities throughout the United States are designed to target women at

Table 2: Commonly used screening questionnaires for identifying problem drinking

CAGE:

- Have you ever felt you should **C**ut down on your drinking?
- Have people **A**nnoyed you by criticizing your drinking?
- Have you ever felt bad or **G**uilty about your drinking?
- Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (**E**ye opener)?

Each item receives a score of 1 for a positive response (Ewing 1984).

T-ACE:

- **T**olerance—How many drinks can you hold?
- Have people **A**nnoyed you by complaining about your drinking?
- Have you ever felt you ought to **C**ut down on your drinking?
- **E**ye opener—Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover?

A score of 2 is given for a positive response to the tolerance question; 1 point each is scored for the other three questions (Sokol 1989).

TWEAK:

- How many drinks can you hold? (**T**olerance)
- Does your spouse [or do your parents] ever **W**orry or complain about your drinking?
- Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover? (**E**ye opener)
- Have you ever awakened the morning after some drinking the night before and found that you could not remember a part of the evening before? (**A**mnesia)
- Have you ever felt you ought to cut [**K**ut] down on your drinking?

Positive answers to the tolerance and worry questions score 2 points each; the other three questions score 1 point each (Chan et al. 1993).

MAST (Michigan Alcoholism Screening Test):

Consists of 25 questions, each weighted 0, 1, 2, or 5, and when summed yielding scores of 0 to 53 (Selzer 1971).

highest risk for having FAS children, little is known about the effectiveness of these programs. They are generally funded by community services and agencies that tend not to require outcome evaluations.

Because barriers to treatment for these highest risk women clearly exist (Breitbart et al. 1994; Klein and Zahnd 1997; Messer et al. 1996), there is a critical need for research that develops and tests aggressive targeting strategies, referral patterns, and intervention components (Loneck et al. 1997).

For those women identified as having the greatest risk of an FAS birth, a wide range of indicated prevention strategies exists. The research task at hand is to determine which types of therapy are most effective for which subtypes of women (see Loneck et al. 1997; Peterson and Lowe 1992). Specifically, studies need to assess the comparative effectiveness of brief versus extended interventions; coercive versus voluntary therapies, such as motivational enhancement (Miller and Rollnick 1991); and group versus individual approaches (see Stratton et al. 1996, pp. 138–145). This goal can be achieved through systematic assessments that adapt state-of-the-art evaluation methodologies to these particular groups of women, and perhaps through the development of unique evaluation techniques that take into account the fact that FAS, ARBD, and ARND are relatively rare conditions. Also needing evaluation are various prototypes of case management, social network therapy, support groups for FAS mothers, environmental change, and "social model" approaches to recovery, such as the community reinforcement approach (Meyers and Smith 1995; Meyers et al. 1996).

One effective strategy noted in the literature is intensive case management for alcohol-abusing women who have had FAS children (Bacon 1988; Davis and Frost 1984; Masis and May 1991; Rosett et al. 1981; Stratton et al. 1996; Weiner et al. 1989). Another approach used in some indicated prevention programs combines alcohol interventions with the promotion of contraceptive use (Masis and May 1991; May 1995), although the relative benefits and costs of this approach have not yet been determined.

The effectiveness of another indicated prevention strategy, the use of "aftercare" programs for women who have had FAS births, also needs more study. By maintaining contact with these women, aftercare programs may help in eliminating alcohol in breast milk, protecting against further FAS births, encouraging better health status, and coordinating alcohol and other drug abuse care across relevant health agencies. Aftercare studies could additionally evaluate such variables as job placement, education, housing, and legal matters (Klein and Zahnd 1997), as well as marital relations and emotional state. In addition, aftercare might be an effective FAS prevention strategy for new mothers identified as early-onset heavy drinkers, even when their babies do not show evidence of alcohol impairment. Self-help groups, such as Alcoholics Anonymous and Women for Sobriety, might effectively be involved in aftercare support for these women (Kaskutas 1996).

According to the IOM report (Stratton et al. 1996), indicated prevention can be promoted through intensive professional education (Bowen and Sammons 1988; Davis and Frost 1984; Little et al. 1981). Because pregnant women frequently delay obstetric care until the third trimester or delivery, the report recommends that any health care provider who encounters women who are abusing alcohol should consider brief intervention therapy, counseling regarding the risks of prenatal alcohol exposure, and (if appropriate) referral to more formal alcohol abuse treatment (Stratton et al. 1996). This type of approach has been termed "inreach" (Howard 1982, 1987), because health care providers are piggybacking preventive interventions on patient visits that have presumably been scheduled for other purposes.

For women who continue to abuse alcohol during pregnancy, comprehensive clinical treatment programs may be necessary (Finkelstein 1993; Jessup and Green 1987; Rosett and Weiner 1981). These programs generally include medical and obstetric care in addition to alcohol and other

drug abuse services, which in turn involve individual or group counseling, family therapy, referral to self-help groups, parenting skills training, and case management (Stratton et al. 1996), as well as information on the effects and risks of alcohol consumption. Changes in the environment of pregnant women may also be involved through the use of voluntary halfway houses or sheltered living and through changes in social networks (Namyniuk et al. 1997).

A number of communities have mandated court-ordered or involuntary participation in alcohol abuse treatment for heavily drinking pregnant women as a means of preventing FAS. These types of coercive programs have stimulated legal and ethical debates in the literature concerning the comparative rights of the pregnant woman, the fetus, and society at large (Chavkin and Breitbart 1997; Garcia 1993; May 1995; Peak and Del Papa 1993; Vanderveen 1989). However, there have been few descriptions, let alone studies, of this approach as a prevention strategy (Berkowitz et al. 1996*a*; Hughes et al. 1995; Loneck et al. 1997). Although important questions about the effectiveness of such programs remain unanswered, certain findings are encouraging. One study reported that women mandated for drug treatment by courts in California were more likely to comply with and complete alcohol and other drug abuse treatment (Berkowitz et al. 1996*b*). Similarly, another report found that coerced referrals for alcohol and other drug abuse, including Johnson-style, high-intensity family confrontations (a therapeutic technique in which members of the person's family confront him or her about the damage the drinking or other drug use has caused and the action they will take if treatment is refused), significantly increased the likelihood of completed treatment (Loneck et al. 1997). The authors therefore concluded that "to continue to routinely use low-intensity referrals for women is tantamount to withholding a more potent form of treatment" (Loneck et al. 1997, p. 43).

Conversely, critics of this point of view are concerned about the possible deterrent effect of court sanctions and coercive treatment referrals on pregnant women's participation in prenatal care settings where their alcohol abuse may be detected (Chavkin and Breitbart 1997; Peak and Del Papa 1993). To resolve the controversy, future evaluations would need to include not only women for whom treatment had been mandated but also heavily drinking pregnant women without mandated treatment, and to investigate changes in actual drinking behavior, not simply the completion of treatment.

International Considerations

With the exception of certain selected communities and particular racial/ethnic groups such as American Indians in the United States, most groups have been slow to promote aggressive prevention of FAS and to evaluate it carefully. This may be due, in part, to the fact that full-blown FAS occurs rarely and in specific subsets of the general population. The highest rates for FAS in the United States have been found in inner-city, low-socioeconomic areas (Abel 1995) and in certain high-risk American Indian communities (Duimstra et al. 1993; May 1991; Quaid et al. 1993; Robinson et al. 1987). In those American Indian communities where FAS has been found to be highly prevalent, prevention has been a strong community concern. In the past two decades, many American Indian communities have openly lent themselves to epidemiologic studies in their populations and have consequently provided valuable information that may be relevant to prevention in other populations (Masis and May 1991).

Recent National Institute on Alcohol Abuse and Alcoholism-supported pilot studies in the Republic of South Africa have shown patterns of FAS occurrence, maternal risk, and FAS characteristics that are similar to those documented in North American communities, except that the prevalence of FAS in certain South African communities is quite high (May et al. 1999*a*). For these studies, the researchers measured FAS prevalence by surveying the entire first-grade population in a South African community, which bypassed the difficulties of diagnosing FAS in newborns and infants. In South African populations, patterns of binge

drinking and heavy drinking that produce FAS tend to be associated with rapid community change, detribalization, rural-to-urban transitions, and progressions from traditional to modern (secular) culture (May et al. 1999*a*). These associations are similar to those seen in the United States (May 1991, 1995). In these changing social and cultural contexts, alcohol and other drug use begin to replace other activities as major forms of adaptation, coping, and recreation (May et al. 1999*b*). Moreover, the high rate of FAS found in selected areas of South Africa may well foreshadow increases in FAS in other parts of that country and in other developing societies throughout the world, where similar social changes are superimposed on groups with existing vulnerabilities and risk factors for FAS.

In Closing

Progress in the prevention of FAS will need to begin with research that establishes baseline information about the prevalence of FAS and identifies more precisely those women who are at highest risk of bearing an alcohol-affected child. Equally important, the effectiveness of different FAS prevention approaches must be determined through carefully controlled evaluation studies. Each of the levels of prevention (universal, selected, and indicated), as well as the specific modalities used within each, will need to be examined both in isolation and as part of comprehensive programs. Because FAS and other adverse effects of drinking during pregnancy are theoretically 100-percent preventable, it is vital to make every effort to achieve this goal.

References

Abel, E.L. Fetal alcohol syndrome in families. *Neurotoxicol Teratol* 10(1):1–2, 1988.

Abel, E.L. An update on incidence of FAS: FAS is not an equal opportunity birth defect. *Neurotoxicol Teratol* 17(4):437–443, 1995.

Abel, E.L., and Sokol, R.J. Incidence of fetal alcohol syndrome and economic impact of FAS-related anomalies. *Drug Alcohol Depend* 19(1): 51–70, 1987.

Abma, J.C., and Mott, F.L. Substance use and prenatal care during pregnancy among young women. *Fam Plann Perspect* 23(3):117–122, 128, 1991.

Bacon, F.S. Counseling aspects of alcohol use in pregnancy: Beyond primary prevention. *Alcohol Treat Q* 5(3–4):257–267, 1988.

Berkowitz, G.; Brindis, C.; and Clayson, Z. Using a multimethod approach to measure success in perinatal drug treatment. *Eval Health Professions* 19(1):48–67, 1996*a*.

Berkowitz, G.; Brindis, C.; Clayson, Z.; and Peterson, S. Options for recovery: Promoting success among women mandated to treatment. *J Psychoactive Drugs* 28(1):31–38, 1996*b*.

Bingol, N.; Schuster, C.; Fuchs, M.; Iosub, S.; Turner, G.; Stone, R.K.; and Gromisch, D.S. Influence of socioeconomic factors on the occurrence of fetal alcohol syndrome. *Adv Alcohol Subst Abuse* 6(4):105–118, 1987.

Bowen, O.R., and Sammons, J.H. The alcohol-abusing patient: A challenge to the profession. *JAMA* 260(15):2267–2270, 1988.

Bradley, K.A.; Boyd-Wickizer, J.; Powell, S.H.; and Burman, M.L. Alcohol screening questionnaires in women: A critical review. *JAMA* 280(2):166–171, 1998.

Breitbart, V.; Chavkin, W.; and Wise, P.H. The accessibility of drug treatment for pregnant women: A survey of programs in five cities. *Am J Public Health* 84(10):1658–1661, 1994.

Brindis, C.D., and Theidon, K.S. The role of case management in substance abuse treatment services for women and their children. *J Psychoactive Drugs* 29(1):79–88, 1997.

Bull, L.B.; Kvigne, V.L.; Leonardson, G.R.; Lacina, L.; and Welty, T.K. Validation of a self-administered questionnaire to screen for prenatal alcohol use in Northern Plains Indian women. *Am J Prev Med* 16(3):240–243, 1999.

Chan, A.W.; Pristach, E.A.; Welte, J.W.; and Russell, M. Use of the TWEAK test in screening for alcoholism/heavy drinking in three populations. *Alcohol Clin Exp Res* 17(6):1188–1192, 1993.

Chang, G.; Behr, H.; Goetz, M.A.; Hiley, A.; and Bigby, J. Women and alcohol abuse in primary care: Identification and intervention. *Am J Addict* 6(3):183–192, 1997.

Chang, G.; Wilkins-Haug, L.; Berman, S.; Goetz, M.A.; Behr, H.; and Hiley, A. Alcohol use and pregnancy: Improving identification. *Obstet Gynecol* 91:892–898, 1998.

Chavkin, W., and Breitbart, V. Substance abuse and maternity: The United States as a case study. *Addiction* 92(9):1201–1205, 1997.

Coles, C.D.; Russell, C.L.; and Schuetze, P. Maternal substance use: Epidemiology, treatment outcome, and developmental effects: An annotated bibliography, 1995. *Subst Use Misuse* 32(2):149–168, 1997.

CRISP (Computer Retrieval of Information on Scientific Projects). Current awards query on research project 3R01AA09440-09S2 [web site]. Available at: http://www-commons.cit.nih.gov/crisp/index.html. Accessed January 7, 2000.

Davis, J.H., and Frost, W.A. Fetal alcohol syndrome: A challenge for the community health nurse. *J Community Health Nurs* 1(2):99–110, 1984.

Davis, A., and Lipson, A. A challenge in managing a family with fetal alcohol syndrome [Letter]. *Clin Pediatr* 23(5):304, 1984.

Dawson, D.A. Consumption indicators of alcohol dependence. *Addiction* 89(3):345–350, 1994.

Day, N.L.; Jasperse, D.; Richardson, G.; Robles, N.; Sambamoorthi, U.; Taylor, P.; Scher, M.; Stoffer, D.; and Cornelius, M. Prenatal exposure to alcohol: Effect on infant growth and morphologic characteristics. *Pediatrics* 84(3):536–541, 1989.

Day, N.L.; Richardson, G.; Robles, N.; Sambamoorthi, U.; Taylor, P.; Scher, M.; Stoffer, D.; Jasperse, D.; and Cornelius, M. Effect of prenatal alcohol exposure on growth and morphology of offspring at 8 months of age. *Pediatrics* 85(5): 748–752, 1990.

Day, N.L.; Robles, N.; Richardson, G.; Geva, D.; Taylor, P.; Scher, M.; Stoffer, D.; Cornelius, M.; and Goldschmidt, L. The effects of prenatal alcohol use on the growth of children at three years of age. *Alcohol Clin Exp Res* 15(1):67–71, 1991.

Day, N.L.; Cottreau, C.M.; and Richardson, G.A. The epidemiology of alcohol, marijuana, and cocaine use among women of childbearing age and pregnant women. *Clin Obstet Gynecol* 36(2):232–245, 1993.

Duimstra, C.; Johnson, D.; Kutsch, C.; Wang, B.; Zentner, M.; Kellerman, S.; and Welty, T. A FAS surveillance pilot project in American Indian communities in the Northern Plains. *Public Health Rep* 108(2):225–229, 1993.

Ewing, J.A. Detecting alcoholism: The CAGE questionnaire. *JAMA* 252(14):1905–1907, 1984.

Farquhar, J.W.; Fortmann, S.P.; Flora, J.A.; Taylor, C.B.; Haskell, W.L.; Williams, P.T.; Maccoby, N.; and Wood, P.D. Effects of communitywide education on cardiovascular disease risk factors: The Stanford Five-City Project. *JAMA* 264(3): 359–365, 1990.

Finkelstein, N. Treatment programming for alcohol and drug-dependent pregnant women. *Int J Addict* 28(13):1275–1309, 1993.

Fitzgerald, P. FAS persists despite broad public awareness. *Mich Med* 87(5):262–268, 1988.

Garcia, S.A. Maternal drug abuse: Laws and ethics as agents of just balances and therapeutic interventions. *Int J Addict* 28(13):1311–1339, 1993.

Gehshan, S. Missed opportunities for intervening in the lives of pregnant women addicted to alcohol or other drugs. *J Am Med Womens Assoc* 50(5):160–163, 1995.

Godel, J.C.; Pabst, H.F.; Hodges, P.E.; Johnson, K.E.; Froese, G.J.; and Joffres, M.R. Smoking and caffeine and alcohol intake during pregnancy in a northern population: Effect on fetal growth. *Can Med Assoc J* 147(2):181–188, 1992.

Godley, S.H.; Godley, M.D.; Pratt, A.; and Wallace, J.L. Case management services for adolescent substance abusers: A program description. *J Subst Abuse Treat* 11(4):309–317, 1994.

Gomberg, E.S. Alcoholic women in treatment: The question of stigma and age. *Alcohol Alcohol* 23(16):507–514, 1988.

Gruenewald, P.J. Analysis approaches to community evaluation. *Eval Rev* 21(2):209–230, 1997.

Habbick, B.F.; Nanson, J.L.; Snyder, R.E.; Casey, R.E.; and Schulman, A.L. Foetal alcohol syndrome in Saskatchewan: Unchanged incidence in a 20-year period. *Can J Public Health* 87(3): 204–207, 1996.

Hankin, J.R. FAS prevention strategies: Active and passive measures. *Alcohol Health Res World* 18(1):62–66, 1994.

Hankin, J.R., and Sokol, R.J. Identification and care of problems associated with alcohol ingestion in pregnancy. *Semin Perinatol* 19(4):286–292, 1995.

Hankin, J.R.; Sloan, J.J.; Firestone, I.J.; Ager, J.W.; Sokol, R.J.; and Martier, S.S. A time series analysis of the impact of the alcohol warning label on antenatal drinking. *Alcohol Clin Exp Res* 17(2):284–289, 1993.

Hankin, J.R.; Firestone, I.J.; Sloan, J.J.; Ager, J.W; Sokol, R.J.; and Martier, S.S. Heeding the alcoholic beverage warning label during pregnancy: Multiparae versus nulliparae. *J Stud Alcohol* 57(2):171–177, 1996.

Harwell, T.S.; Spence, M.R.; Sands, A.; and Iguchi, M.Y. Substance use in an inner-city family planning population. *J Reprod Med* 41(9): 704–710, 1996.

Hilton, M.E. The demographic distribution of drinking problems in 1984. In: Clark, W.B., and Hilton, M.E., eds. *Alcohol in America: Drinking Practices and Problems.* Albany, NY: State University of New York, 1991. pp. 87–101.

Hingson, R.; McGovern, T.; Howland, J.; Heeren, T.; Winter, M.; and Zakocs, R. Reducing alcohol-impaired driving in Massachusetts: The Saving Lives Program. *Am J Public Health* 86(6):791–797, 1996.

Holder, H.; Saltz, R.F.; Grube, J.W.; Voas, R.B.; Gruenewald, P.J.; and Treno, A.J. A community prevention trial to reduce alcohol-involved accidental injury and death: Overview. *Addiction* 92(supp. 2):155–171, 1997.

Howard, J. In-reach: An approach to the secondary prevention of cancer. In: Parron, D.L.; Solomon, F.; and Jenkins, C.D., eds. *Behavior, Health Risks, and Social Disadvantage.* IOM Pub. No. 82-002. Washington, DC: National Academy Press, 1982. pp. 51–61.

Howard, J. "Avoidable mortality" from cervical cancer: Exploring the concept. *Soc Sci Med* 24(6):507–514, 1987.

Hughes, P.H.; Coletti, S.D.; Neri, R.L; Urmann, C.F.; Stahl, S.; Sicilian, D.M.; and Anthony, J.C. Retaining cocaine-abusing women in a therapeutic community: The effect of a child live-in program. *Am J Public Health* 85(8 pt. 1): 1149–1152, 1995.

Ihlen, B.M.; Amundsen, A.; Sande, H.A.; and Daae, L. Changes in the use of intoxicants after onset of pregnancy. *Br J Addict* 85:1627–1631, 1990.

Jacobson, J.L., and Jacobson, S.W. Prenatal alcohol exposure and neurobehavioral development: Where is the threshold? *Alcohol Health Res World* 18(1):30–36, 1994.

Jacobson, J.L.; Jacobson, S.W.; Sokol, R.J.; Martier, S.S.; Ager, J.W.; and Kaplan-Estrin, M.G. Teratogenic effects of alcohol in infant development. *Alcohol Clin Exp Res* 17(1): 174–183, 1993.

Jessup, M., and Green, J.R. Treatment of the pregnant alcohol-dependent woman. *J Psychoactive Drugs* 19(2):193–203, 1987.

Kaskutas, L.A. Pathways to self-help among women for sobriety. *Am J Drug Alcohol Abuse* 22(2):259–280, 1996.

Kaskutas, L.A., and Graves, K. Relationship between cumulative exposure to health messages and awareness and behavior-related drinking during pregnancy. *Am J Health Promot* 9(2):115–124, 1994.

Kaskutas, L.A.; Greenfield, T.; Lee, M.E.; and Cote, J. Reach and effects of health messages on drinking during pregnancy. *J Health Educ* 29(1):11–20, 1998.

Kaufman, E. Diagnosis and treatment of drug and alcohol abuse in women. *Am J Obstet Gynecol* 174(1 pt. 1):21–27, 1996.

Khoury, M.J.; Boyle, C.; DeCoufle, P.; Floyd, L.; and Hymbaugh, K. The interface between dysmorphology and epidemiology in the "diagnosis" and surveillance for fetal alcohol effects. *Pediatrics* 98(2 pt. 1):315–316, 1996.

Klein, D., and Zahnd, E. Perspectives of pregnant substance-abusing women: Findings from the California Perinatal Needs Assessment. *J Psychoactive Drugs* 29(1):55–66, 1997.

Little, R.E.; Grathwohl, H.L.; Streissguth, A.P.; and McIntyre, C. Public awareness and knowledge about the risks of drinking during pregnancy in Multnomah County, Oregon. *Am J Public Health* 71(3):312–314, 1981.

Little, R.E.; Young, A.; and Streissguth, A.P. Preventing fetal alcohol effects: Effectiveness of a demonstration project. In: *Mechanisms of Alcohol Damage in Utero.* London, UK: Pitman, 1984. pp. 254–283.

Little, R.E.; Streissguth, A.P.; Guzinski, G.M.; Uhl, C.N.; Paulozzi, L.; Mann, S.L.; Young, A.; Clarren, S.K.; and Grathwohl, H.L. An evaluation of the pregnancy and health program. *Alcohol Health Res World* 10:44–53, 71, 75, 1985.

Loneck, B.; Garrett, J.; and Banks, S.M. Engaging and retaining women in outpatient alcohol and other drug treatment: The effect of referral intensity. *Health Soc Work* 22(1):38–46, 1997.

Luepker, R.V.; Rosamond, W.D.; Murphy, R.; Sprafka, J.M.; Folsom, A.R.; McGovern, P.G.; and Blackburn, H. SEC and coronary heart disease risk factor trends: The Minnesota Heart Survey. *Circulation* 88(5 pt. 1):2172–2179, 1993.

Masis, K.B., and May, P.A. A comprehensive local program for the prevention of Fetal Alcohol Syndrome. *Public Health Rep* 106(5):484–489, 1991.

May, P.A. Fetal alcohol effects among North American Indians: Evidence and implications for society. *Alcohol Health Res World* 15(3):239–248, 1991.

May, P.A. A multiple-level comprehensive approach to the prevention of fetal alcohol syndrome (FAS) and other alcohol-related birth defects (ARBD). *Int J Addict* 30:1549–1602, 1995.

May, P.A. Research issues in the prevention of FAS and ARBD. In: Howard, J.M.; Martin, S.E.; Mail, P.D.; Hilton, M.E.; and Taylor, E.D., eds. *Women and Alcohol: Issues for Prevention Research.* NIAAA Research Monograph 32. NIH Pub. No. 96-3817. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, 1996. pp. 93–131.

May, P.A.; Hymbaugh, K.J.; Aase, J.M.; and Samet, J.M. Epidemiology of fetal alcohol syndrome among American Indians of the Southwest. *Soc Biol* 30(4):374–387, 1983.

May, P.A.; Miller, J.H.; and Wallerstein, N. Motivation and prevention of substance abuse. *Exp Clin Psychopharmacol* 1(1–4):68–79, 1993.

May, P.A.; Viljoen, D.; Gossage, J.; Brooke, L.; and Croxford, J. An epidemiological analysis of data from children with fetal alcohol syndrome and controls in Wellington, South Africa. *Alcohol Clin Exp Res* 23(5):111A, 1999*a*.

May, P.A.; Viljoen, D.; Gossage, J.; Brooke, L.; and Croxford, J. An update on the maternal risk factors associated with the prevalence of fetal alcohol syndrome in Wellington, South Africa. *Alcohol Clin Exp Res* 23(5):91A, 1999*b*.

Messer, K.; Clark, K.A.; and Martin, S.L. Characteristics associated with pregnant women's utilization of substance abuse treatment services. *Am J Drug Alcohol Abuse* 22(3):403–422, 1996.

Meyers, R.J.; Dominguez, T.P.; and Smith, J.E. Community reinforcement approach training with concerned others. In: Van Hasselt, V.D., and Hersen, J. *Source Book of Psychological Treatment Manuals for Adult Disorders.* New York, NY: Plenum Press, 1996. pp. 157–294.

Meyers, R.J., and Smith, J.E. *Clinical Guide to Alcohol Treatment: The Community Reinforcement Approach.* New York, NY: Guilford Press, 1995.

Miller, W.R., and Rollnick, S. *Motivational Interviewing: Preparing People To Change Addictive Behavior.* New York, NY: Guilford Press, 1991.

Namyniuk, L.; Brems, C.; and Carson, S. Southcentral Foundation–Dena A. Coy: A model program for the treatment of pregnant substance-abusing women. *J Subst Abuse Treat* 14(3): 285–295, 1997.

Oetting, E.R.; Donnermeyer, J.F.; Plested, B.A.; Edwards, R.W.; Kelly, K.; and Beauvais, F. Assessing community readiness for prevention. *Int J Addict* 30(6):659–683, 1995.

Peak, K., and Del Papa, F.S. Criminal justice enters the womb: Enforcing the "right" to be born drug-free. *J Criminal Justice* 21(3):245–263, 1993.

Perry, C.L.; Williams, C.L.; Veblen-Mortenson, S.; Toomey, T.L.; Komro, K.A.; Anstine, P.S.; McGovern, P.G.; Finnegan, J.R.; Forster, J.L.; Wagenaar, A.C.; and Wolfson, M. Project Northland: Outcomes of a communitywide alcohol use prevention program during early adolescence. *Am J Public Health* 86(7):956–965, 1996.

Peterson, P.L., and Lowe, J.B. Preventing Fetal Alcohol Exposure: A cognitive behavioral approach. *Int J Addict* 27(5), 613–626, 1992.

Quaid, J.; Kirkpatrick, J.; Nakamura; and Aase, J. Establishing the occurrence of FAS/FAE in a rural community. *IHS Provider* 18(4):71–75, 1993.

Robbins, C. Sex differences in psychosocial consequences of alcohol and drug abuse. *J Health Soc Behav* 30(1):117–130, 1989.

Robinson, G.C.; Conry, J.L.; and Conry, R.F. Clinical profile and prevalence of Fetal Alcohol Syndrome in an isolated community in British Columbia. *Can Med Assoc J* 137:203–207, 1987.

Rosett, H.L., and Weiner, L. Identifying and treating pregnant patients at risk from alcohol. *Can Med Assoc J* 125:149–154, 1981.

Rosett, H.L.; Weiner, L; and Edelin, K.C. Strategies for prevention of fetal alcohol effects. *Obstet Gynecol* 57(1):1–7, 1981.

Rostand, A.; Kaminski, M.; Lelong, N.; Dehaene, P.; Delestret, I.; Klein-Bertrand, C.; Querleu, D.; and Crepin, G. Alcohol use in pregnancy, craniofacial feature and fetal growth. *J Epidemiol Community Health* 44(4):302–306, 1990.

Rubin, D.H.; Krasilnikoff, P.A.; Leventhal, J.M.; Berget, A.; and Weil, B. Cigarette smoking and alcohol consumption during pregnancy by Danish women and their spouses—A potential source of fetal morbidity. *Am J Drug Alcohol Abuse* 14(3): 405–417, 1988.

Schorling, J.B. The prevention of prenatal alcohol use: A critical analysis of intervention studies. *J Stud Alcohol* 54(3):261–267, 1993.

Selzer, M.L. The Michigan Alcoholism Screening Test: The quest for a new diagnostic instrument. *Am J Psychiatry* 127(12):1653–1658, 1971.

Serdula, M.; Williamson, D.F.; Kendrick, J.S.; Anda, R.F.; and Byers, T. Trends in alcohol consumption by pregnant women: 1985–1988. *JAMA* 265(7):876–879, 1991.

Siegal, H.A.; Rapp, R.C.; Kelliher, C.W.; Fisher, J.H.; Wagner, J.H.; and Cole, P.A. The strengths perspective of case management: A promising inpatient substance abuse treatment enhancement. *J Psychoactive Drugs* 27(1):67–72, 1995.

Smith, I.E.; Lancaster, J.S.; Moss-Wells, S.; Coles, C.D.; and Falek, A. Identifying high-risk pregnant drinkers: Biological and behavioral correlates of continuous heavy drinking during pregnancy. *J Stud Alcohol* 48(4):304–309, 1987.

Sokol, R.J.; Miller, S.I.; and Reed, G. Alcohol abuse during pregnancy: An epidemiologic study. *Alcohol Clin Exp Res* 4(2):135–145, 1980.

Sokol, R.J.; Ager, J.; Martier, S.; DeBanne, S.; Ernhart, C.; Kuzma, J.; and Miller, S.I. Significant determinants of susceptibility to alcohol teratogenicity. *Ann NY Acad Sci* 477:87–102, 1986.

Sokol, R.J.; Martier, S.; and Ager, J.W. The T-ACE questions: Practical prenatal detection of risk-drinking. *Am J Obstet Gynecol* 160(4): 863–870, 1989.

Soman, L.A. Perinatal alcohol and drug use: Community-based prevention strategies. In: Barth, R.P.; Pietrzak, J.; and Ramler, M., eds. *Families Living With Drugs and HIV: Intervention and Treatment Strategies.* New York, NY: Guilford Press, 1992. pp. 61–80.

Stratton, K.; Howe, C.; and Battaglia, F., eds. *Fetal Alcohol Syndrome: Diagnosis, Epidemiology, Prevention, and Treatment.* Washington, DC: National Academy Press, 1996.

Streissguth, A.P.; Clarren, S.K.; and Jones, K.L. Natural history of the fetal alcohol syndrome: A 10-year follow-up of eleven patients. *Lancet* 2(8446):85–91, 1985.

Streissguth, A.P.; Barr, H.M.; and Sampson, P.D. Moderate prenatal alcohol exposure: Effects on child IQ and learning problems at age 7½ years. *Alcohol Clin Exp Res* 14(5):662–669, 1990.

Streissguth, A.P.; Sampson, P.D.; Olson, H.C.; Bookstein, F.L.; Barr, H.M.; Scott, M.; Feldman, J.; and Mirsky, A.F. Maternal drinking during pregnancy: Attention and short-term memory in 14-year-old offspring—A longitudinal prospective study. *Alcohol Clin Exp Res* 18(1):202–218, 1994.

Testa, M., and Leonard, K.E. Social influences on drinking during pregnancy. *Psychol Addict Behav* 9(4):258–268, 1995.

Vanderveen, E. Public health policy: Maternal substance use and child health. *Ann NY Acad Sci* 562:255–259, 1989.

Wagenaar, A.C.; Murray, D.M.; Wolfson, M.; Forster, J.L.; and Finnegan, J.R. Communities Mobilizing for Change on Alcohol: Design of a randomized community trial. *J Community Psychol* (special issue):79–101, 1994.

Wagenaar, A.C.; Gehan, J.P.; Jones-Webb, R.; Wolfson, M.; Toomey, T.L.; Forster, J.L.; and Murray, D.M. Communities Mobilizing for Change on Alcohol: Lessons and results from a 15-community randomized trial. *Am J Community Psychol* 27(3):315–326, 1999.

Wagenaar, A.C.; Murray, D.M.; Gehan, J.P.; Wolfson, M.; Forster, J.L.; Toomey, T.L.; Perry, C.L.; and Jones-Webb, R. Communities Mobilizing for Change on Alcohol: Outcomes from a randomized community trial. *J Stud Alcohol* 61(1):85–94, 2000.

Wagenaar, A.C.; Murray, D.M.; and Toomey, T.L. Communities Mobilizing for Change on Alcohol: Effects of a randomized trial on arrests and traffic crashes. *Addiction,* in press.

Walpole, I.; Zubrick, S.; and Pontre, J. Is there a fetal effect with low to moderate alcohol use before or during pregnancy? *J Epidemiol Community Health* 44:297–301, 1990.

Waterson, E.J., and Murray-Lyon, I.M. Drinking and smoking patterns amongst women attending an antenatal clinic. II. During pregnancy. *Alcohol Alcohol* 24(2):163–173, 1989.

Waterson, E.J., and Murray-Lyon, I.M. Preventing alcohol-related birth damage: A review. *Soc Sci Med* 30(3):349–364, 1990.

Weiner, L.; Morse, B.A.; and Garrido, P. FAS/FAE: Focusing prevention on women at risk. *Int J Addict* 24(5):385–395, 1989.

Weisner, C. The role of alcohol-related problematic events in treatment entry. *Drug Alcohol Depend* 26(2):93–102, 1990.

Wilsnack, S.C., and Beckman, L.J. eds. *Alcohol Problems in Women: Antecedents, Consequences, and Intervention.* New York, NY: Guilford Press, 1984.

Wilsnack, R.W., and Wilsnack, S.C. Women, work, and alcohol: Failures of simple theories. *Alcohol Clin Exp Res* 16(2):172–179, 1992.

Wilsnack, S.C.; Klassen, A.D.; Schur, B.E.; and Wilsnack, R.W. Predicting onset and chronicity of women's problem drinking: A five-year longitudinal analysis. *Am J Public Health* 81(3): 305–318, 1991.

Zlotnick, C.; Franchino, K.; St. Claire, N.; Cox, K.; and St. John, M. The impact of outpatient drug services on abstinence among pregnant and parenting women. *J Subst Abuse Treat* 13(3):195–202, 1996.